WASTEWATER
ANNUAL SUMMARY REPORT 2018

Town of Midland Water & Wastewater Services

Town of Midland Water & Wastewater Services

Executive Summary

The purpose of this report is to provide information to several stakeholders and to satisfy the regulatory requirements of the Amended Environmental Compliance Approval *5708-A72SPG* as issued July 20, 2016

The Owner shall prepare and submit a performance report to the Water Supervisor on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information;

- a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the Works;
- a description of any operating problems encountered, and corrective actions taken;
- a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;
- a summary of any effluent quality assurance or control measures undertaken in the reporting period;
- a summary of the calibration and maintenance carried out on all effluent monitoring equipment
- a description of efforts made, and results achieved in meeting the Effluent Objectives of Condition 6.
- a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;
- a summary of any complaints received during the reporting period and any steps taken to address the complaints;
- a summary of all By-pass, spill or abnormal discharge events;
- a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification;
- a report summarizing all modifications completed as a result of Schedule B, Section 3; and
- any other information the Water Supervisor requires from time to time.

The Town of Midland Wastewater System is in a fit state of repair and followed best industry practices during the repair and maintenance of the system. Infrastructure review occurs regularly between Engineering and Wastewater Services to optimize priority projects and minimize common costs.

Copies of the Amended Environmental Compliance Approval *5708-A72SPG* as issued July 20, 2016 are available upon request.

Introduction

The Town of Midland has prepared this Performance Report for the operations conducted during the 2018 calendar year.

This Performance Report has been prepared to meet the following commitments:

- To provide the Town of Midland, as "the Owner" of the sewage works, a summary of the operation and maintenance of the wastewater treatment plant that took place during the reporting period of January 1, 2018 to December 31, 2018; and
- To comply with Condition 11 of ECA #5708-A72SPG

This Performance Report, provided to the the Town of Midland Mayor and Council, conveys information related to the performance of operations and maintenance, which aids in decision making related to system upgrades and expansion needs.

Ministry of the Environment, Conservation and Parks

The Midland Wastewater Treatment Plant is a conventional activated sludge plant owned and operated by the Town of Midland. The wastewater treatment plant was originally constructed in 1965 as a primary treatment plant. In 1980 the plant was expanded and upgraded to a secondary treatment facility. The treated effluent is discharged via a gravity outfall into Midland Bay (located on Georgian Bay). Environmental Compliance Approval (ECA) Number 5708-A72SPG was issued on July 20, 2016 and governs the operation of the facility. The ECA identifies an average day design capacity of 15,665 m^3/day and a Peak Flow Rate of 37,000 m^3/day.

The treatment plant and collection system are operated under the following Certificates of Classification:

Class III Wastewater Treatment Certificate #89
Class II Wastewater Collection Certificate #2074

For the reporting period covered in this report, The Corporation of the Town of Midland was defined as the Operating Authority of the Wastewater Treatment Plant and the associated collection system.

Town of Midland Water & Wastewater Services

Flows

The 2018 average daily flow was 8735.65 m^3 or 55% of plant rated capacity. The plant discharged a total of 3,183,734.70 m^3 for the reporting period. The 2018 maximum daily flow occurred February 21 when the flow recorded was 23,770.98 m^3. During that day the Midland area expierenced 31.0 mm of rainfall.

Midland Wastewater Treatment Center 2018 Effluent Flows (m^3)

DATE	January	February	March	April	May	June	July	August	September	October	November	December
Total	298956.26	218357.58	282484.61	367111.97	273351.49	223121.54	224422.53	236474.95	218828.07	238477.44	264381.77	274767.89
Avg.	9643.75	10048.49	9112.41	12237.07	8817.79	7437.38	7239.44	7628.22	7294.27	7692.82	8812.73	8863.48
Max.	17034.30	23770.98	12741.28	19350.65	11541.86	8508.76	8544.77	10895.59	7985.87	10201.14	10612.61	12707.98
Min.	7220.56	7401.45	7452.03	8307.74	7521.51	6898.80	6274.46	5486.53	6460.17	6884.41	7299.60	7263.35
Average Daily Flow		8735.65										
Max Daily Flow		23770.98										
YEARLY TOTAL		3183734.70										

Figure 1: The graph below provides a visual display of the Total Monthly Daily Flow in m^3 for 2018

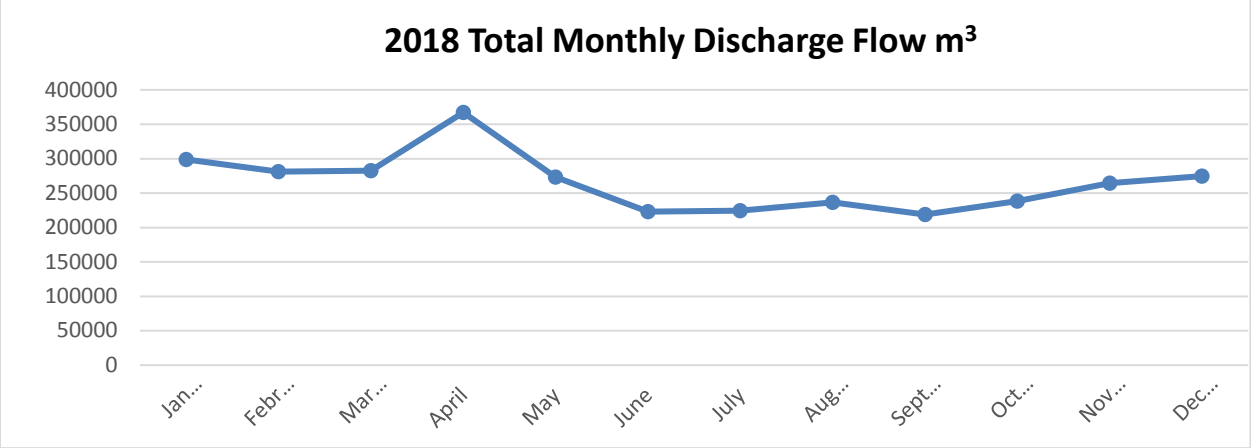
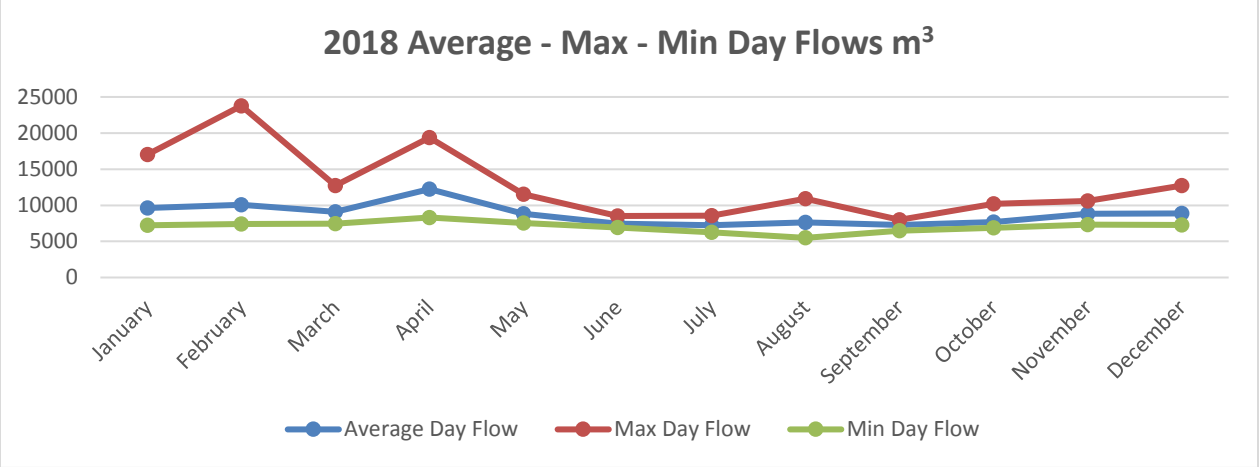


Figure 1: The graph below provides a visual display of the Monthly Average, Max and Min Day Flows in m^3 for 2018



Effluent Flow

The Total Monthly Discharge Flows are consistent through the year except for March to May when the Collection system is influenced by seasonal thaws and infiltration. We are currently conducting an Inflow and Infiltration Study (I&I) in efforts to reduce the unnecessary treatment of rain water and runoff during thaw seasons and storm events. Strategies identified in the I&I study should increase the longevity of the Wastewater Collection System and Treatment Plant and delay the need for expansion.

Town of Midland Water & Wastewater Services

Midland Wastewater Treatment Center 2018 Effluent Loading

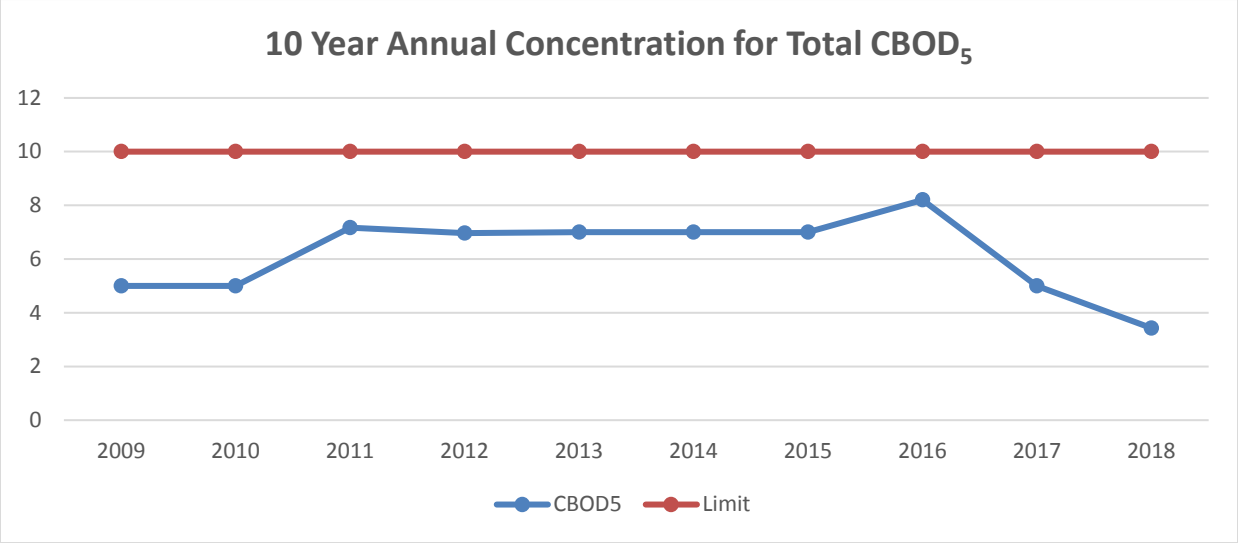
EFFLUENT LOADING 2018

Month	Effluent Flows	$CBOD_5$ Annual Average Concentration		Total Suspended Solids Annual Average Concentration		Total Phosphorus Annual and Monthly Average Concentration (1,716 Kg/Yr)-146 Kg/Month		Total Ammonia Nitrogen Monthly Average Concentration			Total Chlorine Monthly Average Concentration		E.Coli
	m^3	Monthly Average 10 mg/L	Loading 4856 Kg/month	Monthly Average 10 mg/L	Loading 4856 Kg/month	Monthly Avg. 0.4 Monthly-0.3 Yearly mg/l	Loading 146 Kg/month	Monthly Average 10mg/L	Monthly Average 15mg/L	Loading Kg/month	Usage Kg/ month	Effluent Residual 0.02 mg/l	Geometric Mean 200 col/100ml
January	298956.0	3.00	896.87	4.46	1333.34	0.09	26.91		3.96	1183.87	494.86	0.008	113
February	281357.0	6.00	1688.14	3.47	976.31	0.09	25.32		7.99	2248.04	430.08	0.009	40
March	282485.0	3.00	847.46	2.18	615.82	0.07	19.77		11.35	3206.20	360.08	0.002	2
April	367112.0	3.00	1101.34	2.51	921.45	0.07	25.70		5.55	2037.47	423.86	0.005	4
May	273351.5	3.00	820.05	2.27	620.51	0.07	18.59		4.07	1113.09	353.12	0.002	17
June	223121.0	3.00	669.36	2.27	506.48	0.06	13.95	0.55		122.72	418.65	0.002	8
July	224422.5	3.00	673.27	3.31	743.23	0.10	21.32	0.66		147.56	470.88	0.001	9
August	236475.0	3.00	709.42	2.49	588.82	0.09	21.28	1.45		342.89	483.72	0.002	4
September	218828.1	3.00	656.48	2.12	463.92	0.06	13.13		0.55	120.36	447.36	0.001	3
October	238477.0	4.75	1132.77	3.15	751.20	0.08	19.08		0.86	205.09	443.40	0.003	12
November	264381.8	3.40	898.90	3.34	883.04	0.11	29.08		0.65	171.85	461.98	0.004	4
December	274767.9	3.00	824.30	2.81	772.10	0.07	19.23		0.77	211.57	428.83	0.002	2
Total	**3183734.7**							0.89	3.97		**5216.82**		
Monthly Average	**8735.7**	3.43	909.86	2.87	764.69	0.080	21.11	3.20		10190.47	434.74	0.003	18.2
Annual Average	8722.6	3.40	10824.70	3.62	11525.12	0.079	251.52	3.15		10028.76	14.30	0.003	8.3

Town of Midland Water & Wastewater Services

Summary and Interpretation of Monitoring Data

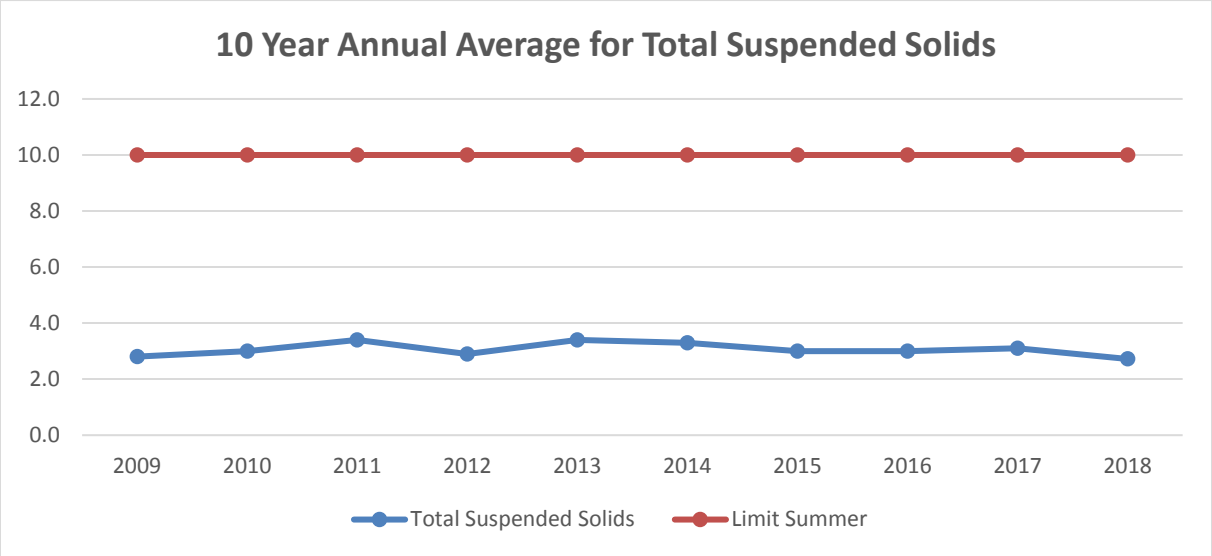
Figure 1: The following graph provides a visual display of the ten year trends of the annual average concentrations for total $CBOD_5$.



Total $CBOD_5$

From the ECA the Monthly Average Concentration release of $CBOD_5$ to the environment is 10 mg/l. During the Reporting Period Midland's Monthly Average $CBOD_5$ was 3.43 mg/ and the annual average was 3.40 mg/ll. $CBOD_5$ represents the quantity of oxygen which is consumed in the course of aerobic processes of decomposition of organic materials, caused by microorganisms. The BOD therefore provides information on the impact the organic portion of the effluent will have on the oxygen level of the receiving stream, and on aquatic life of the bay.

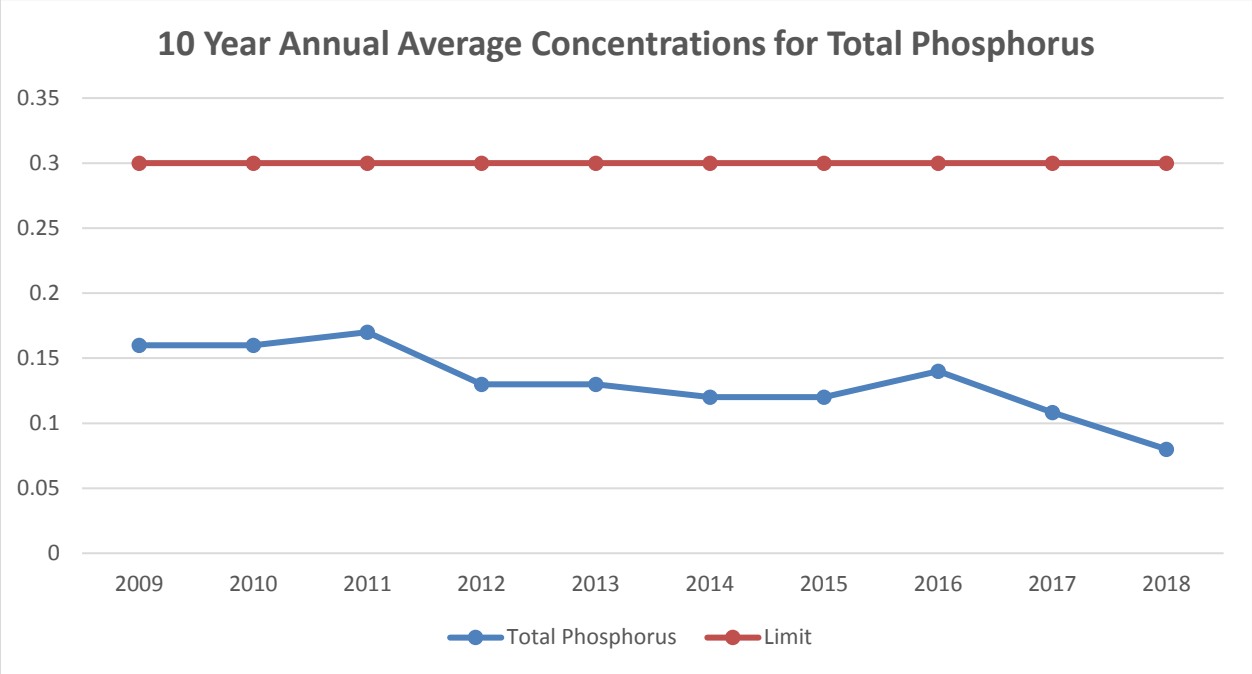
Figure 1: The following graph provides a visual display of the ten year trends of the annual average concentrations for **t**otal suspended solids.



Total Suspended Solids

From the ECA the Monthly Average Concentration for Total Suspended Solids (TSS) released to the environment is 10 mg/l. During the Reporting Period Midland's Monthly Average was 2.87 mg/l and 3.62 annually. TSS are **solids** in water. TSS can include a wide variety of material, such as silt, decaying plant and animal matter, and industrial wastes. High concentrations of **suspended solids** can lower water quality by absorbing light. Waters then become warmer and lessen the ability of the water to hold oxygen necessary for aquatic life.

Figure 1: The following graph provides a visual display of the ten year trends of the annual average concentrations for total phosphorus.



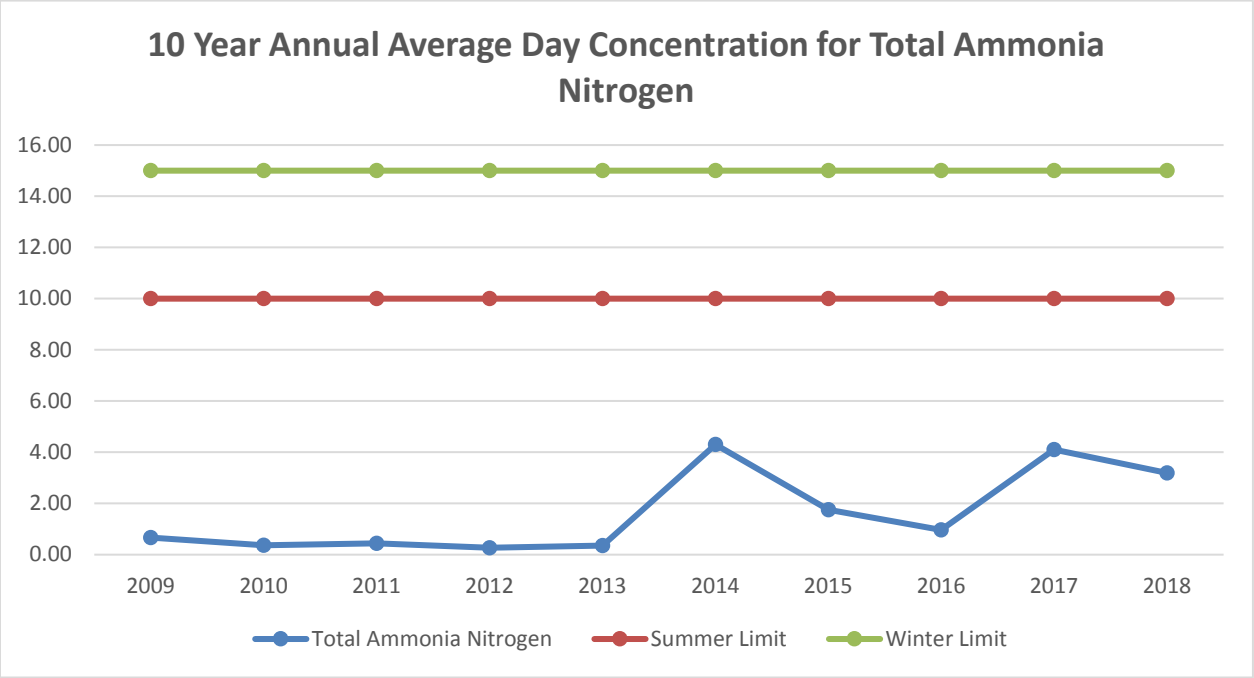
Total Phosphorus

Total Phosphorus is the sum of reactive, condensed and organic phosphorous. It is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of rivers and lakes.

The highest average monthly total phosphorus concentration of 0.11 mg/L took place during the month of November.This concentration results in a total monthly loading for November of 29.09 kg.

The annual average concentration of 0.08 mg/L was well below the annual yearly objective of 0.3 mg/L and also below the 0.4 mg/L monthly limit dictated by the ECA. The total annual phosphorus loading of 251.52 kg is well below the ECA limit of 1,716 kg/year. The monthly objective for phosphorus of 146 kg/month was also achieved with a monthly loading average of 21.11 kg/ month.

Figure 1: The following graph provides a visual display of the ten year trends of the annual average day concentration for total ammonia nitrogen.



Total Ammonia Nitrogen

Total Ammonia is the sum of the free ammonia-nitrogen plus the amount of nitrogen from ammonia that has combined with chlorine. Ammonia pollution is a matter of increasing concern for regulatory authorities because of the serious threat it poses to the balance of sensitive habitats and to flora and fauna. Controlling ammonia discharges from wastewater treatment can make a significant contribution to reducing its environmental impact.

The average concentration of Total Ammonia Nitrogen (T.A.N.) between June 1, 2018 to August 31, 2018 (Summer) was 0.89 mg/L, the ECA limit is 10 mg/L.

The average concentration of Total Ammonia Nitrogen (T.A.N.) between January 1, 2018 to May 31, 2018 and September 1, 2018 and December 31 2018 (Winter) was 3.97 mg/L, the ECA limit is 15 mg/L.

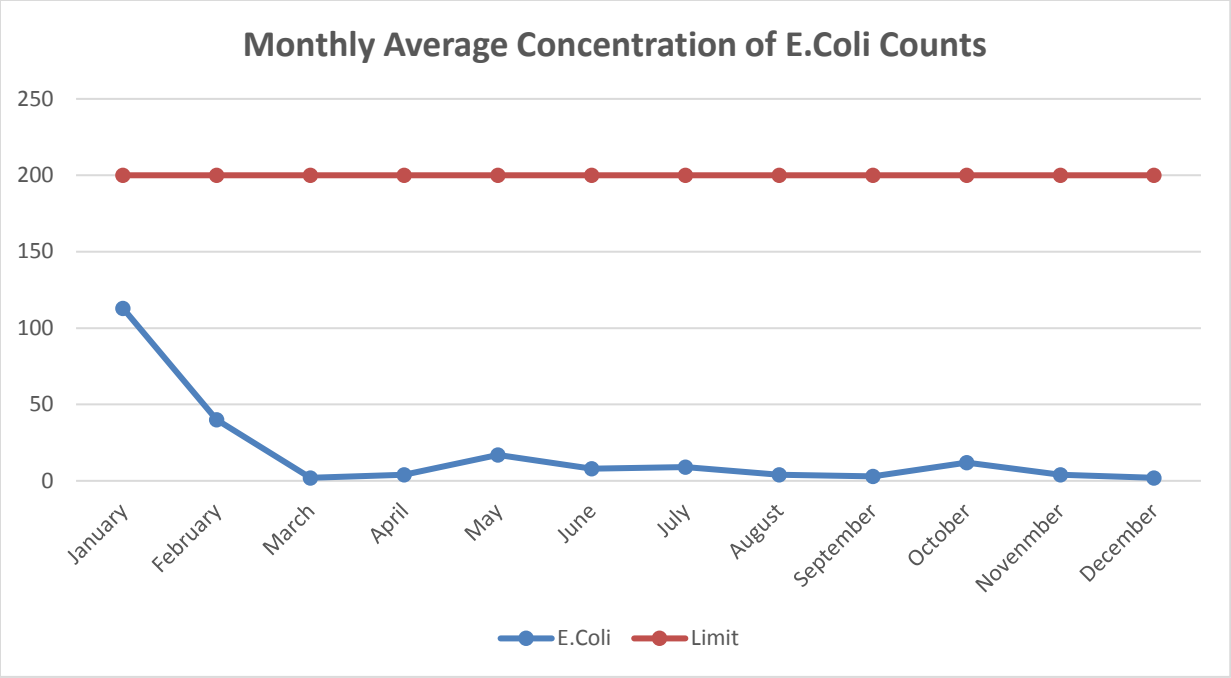
Town of Midland Water & Wastewater Services

Midland Wastewater Treatment Center 2018 Chlorine Usage and Residuals

	January	February	March	April	May	June	July	August	September	October	November	December	Total	Monthly Average
Monthly Chlorine Usage kg	494.9	430.1	360.1	423.9	353.1	418.7	470.9	483.7	447.4	443.4	462.0	428.8	5216.8	
Average Daily Chlorine Use kg	16.0	15.4	11.6	14.1	11.8	14.0	15.2	15.6	14.9	14.3	15.4	13.8		14.3
Monthly Average Residual mg/l	0.008	0.009	0.002	0.005	0.002	0.002	0.001	0.002	0.001	0.003	0.004	0.002		0.003

The monthly usage of Chlorine was concistant throughout 2018 with a total usage of 5216.8 kg. The average daily usage also remained consistant and remained between 11.8 kg/day and 16.0 mg/day for the reporting period in 2018. The Total Chlorine Residual of the Effluent was well below the 0.02 mg/l Objective and Limits set out in the ECA.

Figure 1: The following graph provides a visual display of the monthly average E-Coli Counts per 100 mL of effluent discharged from the works for 2018.



E.Coli

From the ECA the E.Coli, on a Monthly Geometric Mean, must be less than 200 Colony-Forming units/100 ml (CFU's) released to the environment. Midland's Monthly Average e-coli count was 18.2 organsims per 100 millilitres of effluent discharged from the works, dispite the elevated levels in January. Details of these occurances are include in the Operational Challenges section.

Escherichia coli (*E. coli*) are a group of bacteria commonly found in the intestines of warm-blooded animals, including people. *E. coli* in fresh water can indicate the presence of pathogens (disease-causing organisms) from animal or human faeces. The pathogens can cause illness for anyone who ingests them.

Operational Challenges

The operational challenges exerienced in 2018 was controlling the irratic fluctuations within our ECA limit for allowable discharge of E-Coli. The Ultra low range chlorine analyzer that was installed in January 2017 accurately measures chlorine residual in a very low range, confirming that dechlorination is taking place prior to discharge of the effluent to stream. This analyzer replaced the oxidation reduction potential (ORP) probe, which was inadequate. At the end of December 2017 and again in January 2018 we found mixing of the chemicals to be an issue that resulted in elevated E.Coli counts. We moved our injection points and changed our sampling procedure and noticed an improvement in both the control and mixing of chemicals within the chlorinating and dechlorinating stages of treatment. The review and correction of sample procedure was also completed to obtain an more represenative and consistant sample of the effluent to stream.

The Total Ammonia reduction in 2017 was occassionally nearing the limits within the ECA. With the addition of some instrunments and modification to our control strategy and improved oxygen contro of the aeration system we were able to bring this parameter down well within the ECA requirements. Improved process control will be need to continue to achieve the Total Ammonia discharge limts as the hydraulic flow increases with growth.

NASM/Biosolids

In 2018 12,270 m^3 of digested biosolids were hauled from the Town of Midland Wastewater Treatment Plant under contract L04-49844 by Region of Huronia Environmental Services (ROHES). ROHES transport the Biosolids generated to storage lagoons located New Lowell during the winter months and land apply in the summer months.

2018 Biosolids Generated and Hauled

2018	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Loads	19	23	27	18	26	30	36	28	17	20	16	31	291
Volume m^3	840	1004	1134	756	1092	1,228	1512	1176	714	840	672	1302	12270

Town of Midland Water & Wastewater Services

Summary of Effluent Quality Assurance and Control Measures

The Midland WWTP Operators collect samples from Raw Sewage, Primary Clarifier Effluent, Aeration Tanks, Secondary Clarifier Effluent, and Final Effluent on a regular basis throughout the work week. Staff use standardized and accepted laboratory techniques when samples are tested for various parameters in-house for process control and effluent quality assurance. A spreadsheet is used to track in-house lab results to perform several calculations used to monitor and measure the effectiveness of the plant performance. In addition to the in-house analysis, samples are collected weekly and sent to a certified laboratory, Caduceon Environmental Laboratories. These sample results are used to determine compliance with the ECA and Ministry Regulation.

By-passess

In 2018 two plant by-passes occurred at Bay St. SPS #1 (chamber A). The contributing factors were power outage and high flows due to heavy rainfall entering the pump station wet well from combined storm/sewer mains. During a power outage no sewage is pumped from the pumping station and during a major rain event the flows become too much for the station to handle, hense, by-passing within chamber A. This is also known as a sanitary sewer overflow (SSO).

2018 BY-PASS REPORT

Date	Location	Type	Volume (m3)	Duration (Hrs.)	# Events	Rainfall (mm)
June 26 2018	Pump Station #1 – Chamber A	Plant Bypass	156	1.67	1	Power Outage
August 27 2018	Pump Station #1 – Chamber A	Plant Bypass	241	.68	1	18.8
		Total	**397**			

NOTES:

Plant By-Pass -means any diversion of raw sewage around the treatment plant. This sewage does not undergo any treatment before it is discharged to the environment.

Secondary By-Pass or Plant Overflow – means any discharge to the environment from the Sewage Treatment Plant at a location other than the plant outfall (i.e.: storm equalization tank). This type of by-pass receives partial or primary treatment before it is discharged to the environment.

Town of Midland Water & Wastewater Services

Infiltration and Inflow (I&I)

The Town of Midland is currently conducting an **infiltration and inflow (I&I)** study in order to determine magnitude of the I&I problem and, if so, the areas within the Town that would see the most return on investment for repairs. At strategic points within the sanitary system flow monitors were installed along with a rain gauge at the wastewater treatment plant. Over the 12 month flow monitoring program the data collected we were able to calculate a Dry Weather Flow and a Wet Weather Flow along with a Peaking Factor and Estimated Peak I&I. The contractor is now finalizing the report for future capital project considerations.

Calibration

All analyzers and flow meters are calibrated as per the manufacturers recommendations, a minimum of once a year. Calibration was started November 2018 and was completed in January 2019 by a third party instrumentation and controls technician. Calibration Certificates are submitted and retained electronically for each unit and devices. Below is a list of locations of units and devices and description.

Magnetic Flow Meter

Midland WWTP	Raw Sludge Flow
Midland WWTP	RAS Flow
Midland WWTP	Secondary Flow
Midland WWTP	WAS Flow
SPS # 4 Pillsbury	Wet Well Flow
SPS # 6 Vindin	Wet Well Flow
SPS # 7 Bay Port	Discharge Flow

Level Transmitter

SPS # 1 Main	Wet Well Level
Midland # 2 WWTP	Pump House Wet Well
SPS # 3 Aberdeen	Wet Well Level
SPS # 4 Pillsbury	Wet Well Level
SPS # 5 Russ Howard	Wet Well Level
SPS # 6 Vindin	Wet Well Level
SPS # 7 Bay Port	Wet Well Level
Midland WWTP	Septage Level
Midland WWTP	Storm Tank Level
Midland WWTP	Calcium Tank Level
Midland WWTP	Calcium Tank Level

Open Channel Flow

Midland WWTP	Influent Flow
A Chamber	Influent Flow
Midland WWTP	Chamber B
Midland WWTP	Storm Flow
Midland WWTP	Effluent Flow

DO Probes

Midland WWTP	Probe 1
Midland WWTP	Probe 2
Midland WWTP	Probe 3

Total Suspended Solids

Midland WWTP	Probe 1

Town of Midland Water & Wastewater Services

Summary of Maintenance Performed Throughout the Reporting Period

In addition to regular maintenancemanagement program, works were upgraded or replaced in accordance with the Capital Plan as follows.

- Replaced the Roof at Russ Howard Pump Station # 5
- Explosion Proof Receptacles and Heat Trace in Egg Shaped Digester
- Replacement of Diesel Fuel Tank 200 Bay Street
- Replacement of Effluent Strainer
- Flow meters for Chemicals, 2 Alum, 1 Chlorine and 1 Sodium thiosulphate
- Replacement of Second Pump in Storm Tank
- Booster Pump 1/$^{1/2}$
- Flow meter for Dechlorination Pumps
- Programming for Dechlorination System
- Replacement of WW#4 2008 Pontiac Wave. With Mitsubishi Eclipse Electric Car

Summary of Complaints received throughout the Reporting Period

There was one complaint received by the Town of Midland municipal staff throughout the Reporting Period for the Town of Midland Wastewater Treatment Plant for odour. Details of the date and time of the occurrence was not available, and it was believed to be caused by the disposal of Septic Waste.

Limited Operational Flexibility-Notice of Modifications Form

There were no Limited Operation Flexibility or Notice of Modification forms submitted throughout the Reporting Period. All upgrades/modifications have been completed in accordance with the Terms and Conditions of the ECA.

Closing Remarks

Throughout the Reporting Period the Midland WWTC operated to the best of its ability while subject to extensive construction activity, and seasonal influences. With continued construction and typical average daily flows, operations staff expect the WWTC to operate as designed over the next Reporting Period.